

C l a i m s

1. Single screw extruder with a barrier screw and a barrel in which the barrier screw is rotatably mounted and which comprises at least a feed zone longitudinal section and a melting zone longitudinal section, wherein the barrel comprises at its inner surface at least one groove extending in a longitudinal direction in the area of the melting zone longitudinal section.

2. Single screw extruder according to Claim 1, wherein the groove extends parallel to the longitudinal axis of the barrel.

3. Single screw extruder according to Claim 2, wherein the grooves provided in the feed zone longitudinal section extend helically.

4. Single screw extruder according to Claim 1, wherein a plurality of grooves spaced apart in a circumferential direction of the barrel are provided.

5. Single screw extruder according to Claim 1, wherein the width and/or depth ( $h_N$ ) of the groove(s) vary in the longitudinal direction.

6. Single screw extruder according to Claim 5, wherein the depth ( $h_N$ ) of the groove decreases towards the downstream end of the melting zone section preferably to zero.

7. Single screw extruder according to Claim 1, wherein at least one groove is provided in the barrel inner surface in the area of the feed zone section, the groove extending parallel or helically relative to the longitudinal axis.

8. Single screw extruder according to Claim 7, wherein the groove in the area of the feed zone section leads directly into the groove in the area of the melting zone.

9. Single screw extruder according to Claim 8, wherein both grooves have the same lead angle.

10. Single screw extruder according to Claim 1, wherein the lead angle of the groove is variably formed along the longitudinal axis.

11. Single screw extruder according to Claim 1, wherein the barrel is provided as a one-piece barrel.

12. Single screw extruder according to Claim 11, wherein the melting zone section is provided as a barrel tube and the feed zone section is provided as a grooved liner.

13. Single screw extruder according to Claim 1, wherein the barrel has an inner space with a diameter being constant in longitudinal direction.

14. Single screw extruder according to Claim 1, wherein the barrier screw is provided with two or more channel pairs so that two or more solid matter channels and two or more melt channels are defined.

15. Single screw extruder according to Claim 1, wherein the barrier screw comprises a primary side bar and a barrier side bar which defines together with a barrel inner surface in the area of the melting zone longitudinal section respective gaps, both gaps being equal.

16. Single screw extruder according to Claim 1, the barrier screw comprising a primary side bar and a barrier side bar, wherein slots are provided in the primary side bar and/or the barrier side bar, the slots extending in a substantially radial and circumferential direction.

17. Single screw extruder according to Claim 1, wherein the groove in the melting zone longitudinal section is formed differently to the grooves in the feed zone longitudinal section.

18. Single screw extruder according to Claim 17, wherein a great number of narrow and flat helically or axially extending grooves are provided.

19. Method for extruding plastic material using a single screw extruder which comprises a barrel and a barrier screw rotatably mounted therein, the extruder comprising a feed zone and a melting zone and the barrier screw comprising at least a solid matter channel and a melt channel, wherein in the area of the melting zone solid plastic material (solid matter) is transported from the solid matter channel to the melt channel in defined quantities.

20 Method according to Claim 19, wherein the solid matter is transported at defined locations along the barrel from the solid matter channel into the melt channel.

21. Method according to Claim 19, wherein the transport of defined quantities of solid matter is substantially caused by the pressure difference between the solid matter channel and the melt channel.